

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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| In the Matter of |) | |
| |) | WC Docket No. 10-90 |
| Connect America Fund |) | WT Docket No. 10-208 |
| Universal Service Reform – Mobility Fund |) | |

**REPLY TO OPPOSITION TO PETITION FOR
RECONSIDERATION**

T-Mobile USA, Inc. (“T-Mobile”)¹ hereby replies to the opposition filed by the Rural Wireless Association (“RWA”)² to T-Mobile’s Petition for Reconsideration³ of certain aspects of the Commission’s *Mobility Fund Order* in the above-captioned dockets.⁴

In its Petition, T-Mobile urged the Commission to reconsider the speed and latency thresholds adopted in the *Mobility Fund Order*, which are out of sync with the realities of providing mobile service in rural and hard-to-serve areas. RWA was the only party to oppose T-Mobile’s requests. Because reconsideration of these aspects of the *Mobility Fund Order* will help bolster participation in the auction, result in significantly more new coverage in rural areas, and further the Commission’s goals for Phase II of the Mobility Fund (“Phase II”), the Commission should reject RWA’s arguments and grant T-Mobile’s Petition.

¹ T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

² Opposition to Petitions for Reconsideration of The Rural Wireless Association, WC Docket No. 10-90, WT Docket No. 10-208 (May 16, 2017) (“Opposition”).

³ Petition for Reconsideration of T-Mobile USA, Inc., WC Docket No. 10-90, WT Docket No. 10-208 (April 27, 2017) (“Petition”).

⁴ *Connect America Fund; Universal Service Reform – Mobility Fund*, WC Docket No. 10-90; WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 2152 (2017) (“*Mobility Fund Order*”).

I. PHASE II SPEED REQUIREMENTS SHOULD NOT EXCEED ACTUAL MOBILE SERVICE MEDIAN DATA SPEEDS

In its Petition, T-Mobile demonstrated that the speed requirements adopted in the *Mobility Fund Order* exceed the actual median data speeds consistently provided today.⁵ T-Mobile's analysis relied upon Ookla Speedtest Intelligence data ("Ookla data") for the four national wireless carriers (T-Mobile, AT&T, Sprint, and Verizon Wireless).⁶ In its Opposition, RWA questions the accuracy of this analysis based on T-Mobile's reliance upon data for only the four national wireless carriers.⁷ RWA further argues that even if the adopted speed requirements exceed today's actual median data download speeds, such requirements are consistent with the Commission's universal service mandate⁸ and the Commission's determination in other proceedings that a 5 Mbps download speed does not meet the needs of consumers.⁹ None of these arguments has merit.

First, Ookla data irrefutably demonstrates that the adopted speed requirements exceed actual mobile service median data speeds. In addition to the previously-submitted analysis, analysis of Ookla data for carriers other than the four national wireless carriers demonstrates that these carriers also are not consistently meeting the speed requirements adopted under the new rules. Specifically, each of the RWA-member carriers with a sufficient number of Ookla samples to provide relevant data failed to meet either the 10/1 median speed requirement or the 100 milliseconds ("ms") latency standard.¹⁰ Given that neither the four national wireless carriers

⁵ Petition 2-6.

⁶ Petition at 3.

⁷ RWA Opposition at 3.

⁸ RWA Opposition at 2, 3-4.

⁹ RWA Opposition at 5-7.

¹⁰ Based on a preliminary evaluation of Ookla Speedtest Intelligence data (from January 2016 to May 2017), of RWA member carriers with >130 samples available (Union, Strata, Pioneer, and Copper Valley), Union and

nor smaller RWA-member carriers are consistently providing 10/1 median data speeds or 100 ms or less latency (90 percent of the time), it would be overly burdensome to expect carriers to consistently meet such standards in the rural and other hard-to-serve areas to be included in Phase II. Setting such unrealistic performance thresholds would impede the delivery of broadband services to unserved areas.

Moreover, carriers do not consistently meet the 10/1 speed requirement even in relatively urbanized areas.¹¹ As explained in greater detail in the Petition, it is often less technically challenging to provide consistent throughput in urban areas than in rural areas.¹² Despite this technical reality, the four national wireless carriers still do not consistently meet the adopted 10 Mbps median download speed requirement even in relatively urbanized areas.¹³ It would be bad public policy to require Phase II bidders to “overdesign” their networks in rural and hard-to-serve areas to meet a standard not being met consistently in even more densely populated urban areas. Such a requirement would increase bid prices and ultimately yield significantly less new coverage than otherwise could be possible. Notably, RWA fails to address this argument in its Opposition.

Speed requirements that match actual mobile service median data would further the Commission’s goals for Phase II. In the *Mobility Fund Order*, the Commission reaffirmed four goals for Phase II.^{14/} The second of these goals is that funding should be targeted “to support the

Pioneer failed median downlink throughput at 5.2Mbps (n=450) and 6.5Mbps (n=1086) respectively; Strata and Copper Valley failed latency at 111ms (n=244) and 109ms (n=140) respectively.

¹¹ Petition at 4 (“Given that carriers are not hitting a 10 Mbps download standard consistently nationwide, *even in relatively urbanized areas*, it would be overly burdensome to expect carriers to consistently meet such a standard in the rural and other hard-to-serve areas that will be included in Phase II.”) (*emphasis added*).

¹² See Petition at 4.

¹³ *Id.*

¹⁴ *Mobility Fund Order* at paras. 11-15.

deployment of the highest level of mobile service available today—4G LTE.”¹⁵ As T-Mobile has demonstrated, the adopted speed requirements are not reflective of the level of service available today. Moreover, RWA’s support for what it refers to as “forward-looking” performance requirements that do not “merely reflect today’s level of service” similarly fails to further this goal.¹⁶

Speed requirements that are not aligned with actual mobile service median data speeds are also inconsistent with the Commission’s fourth goal for Phase II—that the Commission expend “the finite funds we have available in the most efficient and cost effective manner.”¹⁷ By requiring bidders to overdesign networks to meet an overly aggressive 10 Mbps throughput requirement, the finite funds available in Phase II will be spent in a wasteful, inefficient manner that yields significantly less new coverage than otherwise could be possible.

RWA attempts to argue that T-Mobile’s recent demonstration of compliance with conditions imposed by the Wireless Telecommunications Bureau (“Bureau”) in an unrelated waiver proceeding shows that the Commission must retain the unrealistic speed and latency requirements adopted in the *Mobility Fund Order*.¹⁸ As an initial matter, the Commission should recognize RWA’s argument as little more than an effort to insert a wholly unrelated matter to this proceeding—a continuation of RWA’s meritless attempts on behalf of un-named members to undermine the Bureau’s efforts to bring additional services to rural areas.

RWA contends that because T-Mobile’s recent coverage demonstration is allegedly “overstated,” the Commission must reject T-Mobile’s request for reconsideration in the *Mobility*

¹⁵ *Mobility Fund Order* at para. 13.

¹⁶ Opposition at 3-4.

¹⁷ *Mobility Fund Order* at para. 15.

¹⁸ Opposition at 4-5.

Fund Order. Putting aside the complete lack of logical connection between RWA’s premise and conclusion, RWA’s assertions are simply untrue. T-Mobile coverage projections in Montana are an accurate portrayal of the high-quality service that has caused so many consumers to choose the Un-carrier. For example, in the construction notification submission for station WQJQ807, covering a portion of Montana, T-Mobile used a Maximum Allowable Path Loss (“MAPL”) that projected at least 2 Mbps downlink and 64 Kbps uplink speeds at the cell edge using a 5 MHz LTE carrier for mobile service.¹⁹ The submission noted that real world performance could exceed these speeds.²⁰ This MAPL design was tailored for a -93 dBm Received Signal Strength Indicator (“RSSI”), which is equivalent to a -118 dBm Reference Signal Received Power (“RSRP”). Typically, RSRP is the more common metric for describing LTE signal measurements in a propagation map.

RWA asserts that T-Mobile provides only “fringe coverage” that “does not reflect what consumers would consider good performance,”²¹ but it fails to provide a meaningful assessment. To the contrary, the Commission has accepted performance demonstrations from RWA’s own members in Montana for considerably less robust service. For example, Nemont Communication Inc. (“Nemont”), an RWA member, submitted a construction notification for station WQQL772 asserting that “[an] LTE RSRP signal level of -124.1 dBm is considered by Nemont and the Huawei Base-station equipment ... as the appropriate threshold to provide [service].”²² That is 39 dBm *less* than the RSRP that RWA now asserts is acceptable.²³ The

¹⁹ See ULS application 0007667068, Technical Narrative at 1, entered 2/17/2017. Also included in the design is the use of multiple input and multiple output (MIMO) antennas and other LTE transmission techniques to enhance coverage and throughput.

²⁰ *Id.*

²¹ Opposition at 4-5.

²² See ULS application file no. 0007601143, Engineering Statement & Technical Narrative at 5, submitted 12/22/2016. The construction notification for that station, and in fact for all of Nemont’s 700 MHz licenses,

submission further alleges that “Nemont believes that the FCC’s 4G Broadband requirements of 200 KB/S Uplink and 768 KB/S Downlink is a good cell edge minimum throughput value for a commercial LTE fixed wireless RAN.”²⁴ Yet, Nemont’s design is 6 dB—approximately four times weaker and less than half the downlink speed of T-Mobile’s reference design that RWA complains is fringe coverage.

Nemont’s construction notifications for other Montana licenses show similar designs that RWA would characterize as fringe coverage.²⁵ In particular, in its initial submission for station WQNU217, Nemont relies on a signal level of -100.6 dBm RSSI received at the LTE base station, more than 7 dB—or 6 times weaker—than T-Mobile’s -93 dBm, to cover 51% of the licensed geography.²⁶ Nemont later amended its construction notification to rely on a signal level of -97.2 dBm, which is still 4 dB weaker than T-Mobile’s reference design, to cover 35.42% of the licensed geography, barely over the 35% coverage requirement.²⁷

Furthermore, Nemont’s transmission speed demonstration made as part of its performance notification was similarly less robust than T-Mobile’s. In its initial construction notification submission, Nemont stated that it was providing 200 Kbps downlink, significantly

states that Nemont is providing a fixed 4G LTE service. This permits Nemont to include an additional antenna gain of 10 dBi that a mobile service link budget generally does not include, making direct comparisons of link budgets difficult. Nevertheless, this construction notification seems to belie Nemont’s advertising and promotional materials, which suggest that it provides a *mobile* 4G LTE service. And in fact, Nemont does not advertise the Bandrich Bandlux E500 Fixed Wireless modem or mention the fact that it offers a fixed service on its website or elsewhere. Even worse, a search of the FCC’s Equipment Authorization Database reveals that the Bandrich Bandlux E500 Fixed Wireless Modem is authorized to operate only in the AWS-1, AWS-3, and PCS bands in the United States, not in the 700 MHz band. See FCC ID UZI-P04E68. A review of other Bandrich Fixed Wireless modems that operate in the 700 MHz band (but not specified by Nemont in the construction notification for station WQQL722) indicate the antenna gain for 700 MHz is less than the 10 dBi Nemont claims in the link budget. See FCC ID UZI-35M168.

²³ Opposition at 4 n.18.

²⁴ *Id.* at 2.

²⁵ See ULS applications 0007601143 (WQQL772).

²⁶ See *id.*, Engineering Statement & Technical Narrative at 3, entered 12/12/2016.

²⁷ See *id.*, Engineering Statement & Technical Narrative at 3, entered 5/4/2017.

slower than T-Mobile's reference design. Nemont's amended submission, showing a speed of 1 Mbps downlink, is still only half of the speed used by T-Mobile in the downlink and suspiciously fast in the uplink.²⁸

T-Mobile does not challenge the Commission's acceptance of Nemont's demonstrations nor has it performed a comprehensive review of the performance notifications submitted by all of RWA's members in Montana or elsewhere. However, the few submissions that T-Mobile reviewed demonstrate that RWA's position is disingenuous, renders meaningless its claims that T-Mobile's demonstration of service for station WQJQ807 is evidence of T-Mobile's lack of commitment to providing service in rural areas, and adds nothing to its assertions about appropriate speed requirements for Phase II support recipients.

Accordingly, consistent with the Commission's goals to target support to the level of mobile service available today and expend the available finite funds in the most efficient and cost effective manner, the Commission should instead require a 5 Mbps download speed performance standard.

II. THE LATENCY REQUIREMENT SHOULD BE CONSISTENT WITH THE ACTUAL PERFORMANCE OF MOBILE SERVICES

T-Mobile also requested in its Petition that the Commission reconsider its latency requirement to better reflect the actual performance of mobile services.²⁹ Specifically, T-Mobile proposed replacing the adopted 100 ms or less round-trip with a latency requirement of 220 ms

²⁸ Nemont is not the only RWA member that has met performance requirements using less robust service than RWA now claims is evidence that T-Mobile is not committed to rural areas. Triangle Communications Systems, Inc. ("Triangle") submitted a construction notification for station WQJU694 showing an uplink signal strength of -94.65 dBm, the equivalent to a -118 dBm RSRP—effectively identical to T-Mobile's design. And, Triangle's design projects only a 786 Kbps downlink signal and 200 Kbps uplink signal—inferior to what T-Mobile provides.

²⁹ Petition at 7-9.

or less round-trip.³⁰ In its Opposition, RWA cites to a table in 3GPP TS 23.203 to support its argument that T-Mobile’s proposed latency standard would not support VoLTE and many other LTE applications.³¹ RWA’s argument is flawed.

First, RWA misunderstands T-Mobile’s proposed latency threshold. Specifically, the table in 3GPP TS 23.203 upon which RWA relies provides latency thresholds for *one-way* trips.³² Consistent with the Commission’s adopted standard, however, T-Mobile proposes a latency threshold for *round-trip* time, which is aligned with how latency is reported in Ookla data. Consequently, T-Mobile’s 220 ms round-trip proposal is effectively equivalent to a 110 ms one-way trip. To the extent that RWA supports a 100 ms one-way latency standard, such a standard is closely aligned with T-Mobile’s proposal.

Moreover, RWA’s confusion is an important reminder that the Commission should ensure that Phase II performance requirements are clearly set forth well in advance of the auction. It will also be important to differentiate between performance requirement thresholds as they are *measured* (e.g., by crowdsourced Ookla data), as opposed to how they are *predicted* (e.g., by carrier propagation models). T-Mobile’s proposal highlights measured median thresholds (e.g., 5Mbps downlink) on today’s LTE networks that are designed based on a variety of different propagation link budget assumptions (i.e., often with much lower cell edge throughput requirements). As T-Mobile previously raised with the Commission, the success of

³⁰ *Id.*

³¹ Opposition at 7-8.

³² See 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 14), 3GPP TS 23.203 V14.3.0, Table 6.1.7: Standardized QCI Characteristics, at 49; *id.* at 50 (“The Packet Delay Budget (PDB) defines an upper bound for the time that a packet may be delayed between the UE and the [Policy and Charging Enforcement Function.]”). This is a one-way delay measurement.

Phase II depends upon potential participants having sufficient information about program obligations and procedures prior to the auction.³³

Second, VoLTE has a preferred service QCI assignment. RWA incorrectly argues that the Ookla data latency measurement requirements proposed by T-Mobile would not support VoLTE.³⁴ This is incorrect for several reasons. First and foremost, as discussed above, the T-Mobile proposed latency is a round-trip latency and not a one-way latency. Second, VoLTE is assigned a Quality-of-service Class Identifier (“QCI”) preferable to that assigned to typical internet traffic.³⁵ This means that packets associated with VoLTE will be preferred by the traffic scheduler due to their real-time-application use case. As a result, one would expect the latency performance of VoLTE packets to be better than the measured Ookla data packet latency.³⁶ Consequently, our proposed latency requirements will not affect the ability of carriers to support VoLTE, while making use of a commonly available and repeatable measurement system (*e.g.*, Ookla Speedtest).

³³ See Letter from Cathleen A. Massey, Vice President, Federal Regulatory Affairs, T-Mobile, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 10-90 and WT Docket No. 10-208 (filed Feb. 16, 2017).

³⁴ Opposition at 7.

³⁵ For example, VoLTE is assigned a QCI of 1, the highest QCI identifier, while typical data traffic is assigned a QCI of 6. Additionally, it is important to realize that the 3GPP specification defines a delay budget between the phone (“UE”) and the Policy and Charging Enforcement Function (“PCEF”). To the extent that the Speedtest server is not co-located with the PCEF, one would expect the reported Speedtest latency to be higher than the actual latency to the PCEF.

³⁶ See 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 14), 3GPP TS 23.203 V14.3.0, Table 6.1.7: Standardized QCI Characteristics, at 51 (“Every QCI (GBR and Non-GBR) is associated with a Priority level (see Table 6.1.7). The lowest Priority level value corresponds to the highest Priority. The Priority levels shall be used to differentiate between SDF aggregates of the same UE, and it shall also be used to differentiate between SDF aggregates from different UEs. Via its QCI an SDF aggregate is associated with a Priority level and a PDB. Scheduling between different SDF aggregates shall primarily be based on the PDB. If the target set by the PDB can no longer be met for one or more SDF aggregate(s) across all UEs that have sufficient radio channel quality then Priority shall be used as follows: in this case a scheduler shall meet the PDB of an SDF aggregate on Priority level N in preference to meeting the PDB of SDF aggregates on next Priority level greater than N, until the priority N SDF aggregate’s GBR (in case of a GBR SDF aggregate) has been satisfied.”).

Third, 3GPP allows for up to 300ms one-way latency. RWA again incorrectly argues “A network on which 90% of latency measurements equal 220ms would be an LTE network in name only”³⁷ when, in fact, the very 3GPP table referenced allows for a 300 ms one-way (600ms round trip) packet delay budget for transmission control protocol based services such as “web, e-mail, chat, ftp, p2p file sharing, progressive video, etc.”³⁸ Indeed, these are the very services that make up the foundation of the mobile internet and are key components of a 4G LTE network.

III. CONCLUSION

For all of the reasons above, the Commission should reject RWA’s opposing arguments and reconsider the speed thresholds and latency requirements associated with the Phase II performance obligations proposed by T-Mobile so that the requirements reflect service that is reasonably comparable to that provided in urban areas. Specifically, the Commission should revise the speed requirement from 10 Mbps downlink throughput and 1 Mbps uplink throughput to a more prevalent threshold of 5/1, with at least 90 percent of the required measurements of 0.5 Mbps downlink and 0.15 Mbps uplink speed thresholds. The Commission also should revise the latency standard where 90% of measurements are equal or superior to 220 ms for roundtrip.

Respectfully submitted,

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By: /s/ Steve B. Sharkey

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³⁷ Opposition at 8.

³⁸ See 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 14), 3GPP TS 23.203 V14.3.0, Table 6.1.7: Standardized QCI Characteristics, at 49.

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CERTIFICATE OF SERVICE

I, Indra Sehdev Chalk, an attorney with T-Mobile USA, Inc., hereby certify that on this 26th day of May 2017, I served a copy of the foregoing document on the following via first-class United States mail, postage prepaid:

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